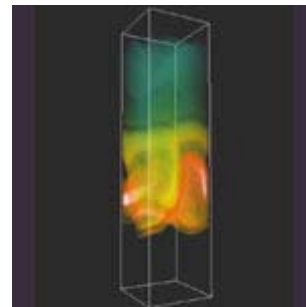
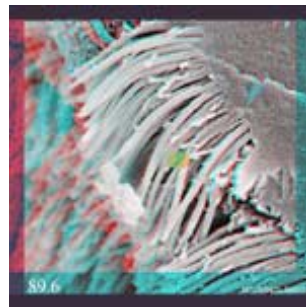
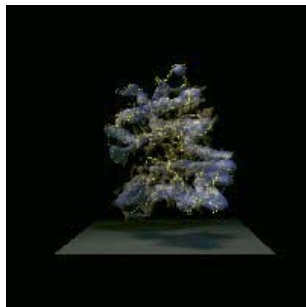


# VisPortal

*Exploring Grid-Enabled Remote/Distributed Visualization  
through a Web/Portal Interface*



Presented at WACE 2003 : June 22 2003

J. Shalf, E.W. Bethel, C.E. Siegerist, P.S. Shetty  
NERSC/LBNL

T.J. Jankun-Kelley, O. Kreylos, K.L. Ma  
CIPIC/UC Davis



# Motivation

- Distributed Collaboratory Support
  - Astrophysics Simulation Collaboratory, Cosmic Simulator, GridLab
- One interface to control Distributed Resources
  - Workflows that cross multiple machines or organizations (vizserver?)
- Deployment Issues
  - Scientists hate to install anything!
  - Grid client software mgmt. remains challenging
- Hiding Complexity of the Grid
  - Manage complexity on **one** machine instead of many
  - Uniform user environment



# Caveats

---

- Usability
  - Do they like it? (friendly users)
  - Do **we** like it?
  - Alternative GUI designs
- Programmability
  - Half of this project is determination of whether such technology is practical for production deployment!
- Grid Issues
  - Infrastructure is a moving target
  - Authorization, file sharing, file permissions control



# Collaboration?

---

- Not yet (or at least not directly)
- Workflows for **existing** collaborations
- Central indices for shared files
- Nexus for launching shared-applications



# Implementation Issues

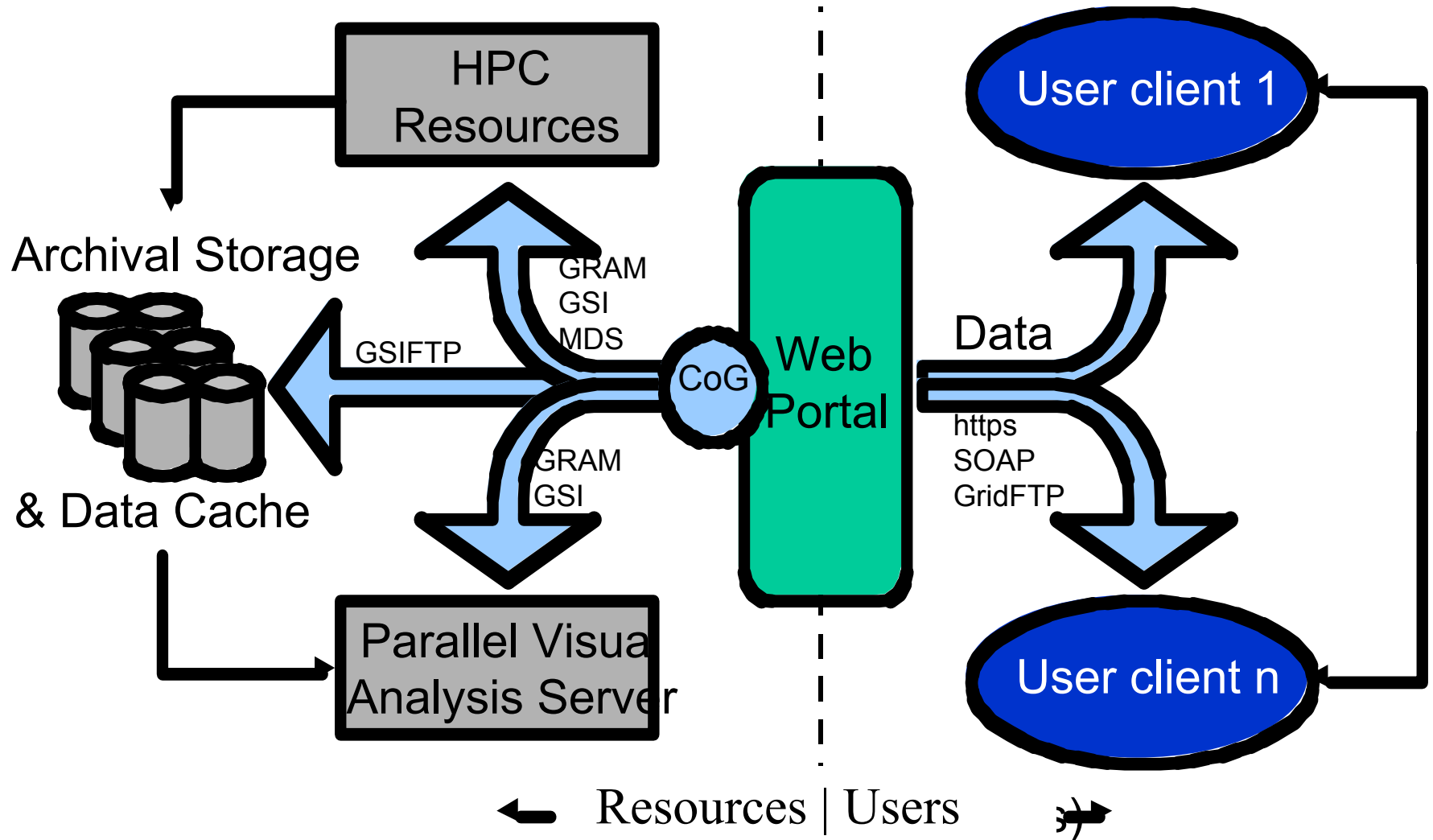
- Choice of Development Platform
  - Java
  - CGI
  - JSP
  - Webware
  - XWT
- Managing the limitations of the DHTML Interface
  - Browser compatibility
  - High latency interface
  - Weak options for GUI presentation
- User “state” management
  - Serialized java beans
  - SQL database back-end



# Software Components

- Apache 1.3.27
- Tomcat 3.3.1
- gpdk cvs version
- Java CoG v1.0a
- mod\_jk 1.3
- mod\_ssl 2.8.12
- openssl 0.9.6h
- globus 2.x
- java 1.3.1\_03
- java 1.4.x
- MyProxy 1.0
- log4j\_1.2.7

# Portal Architecture



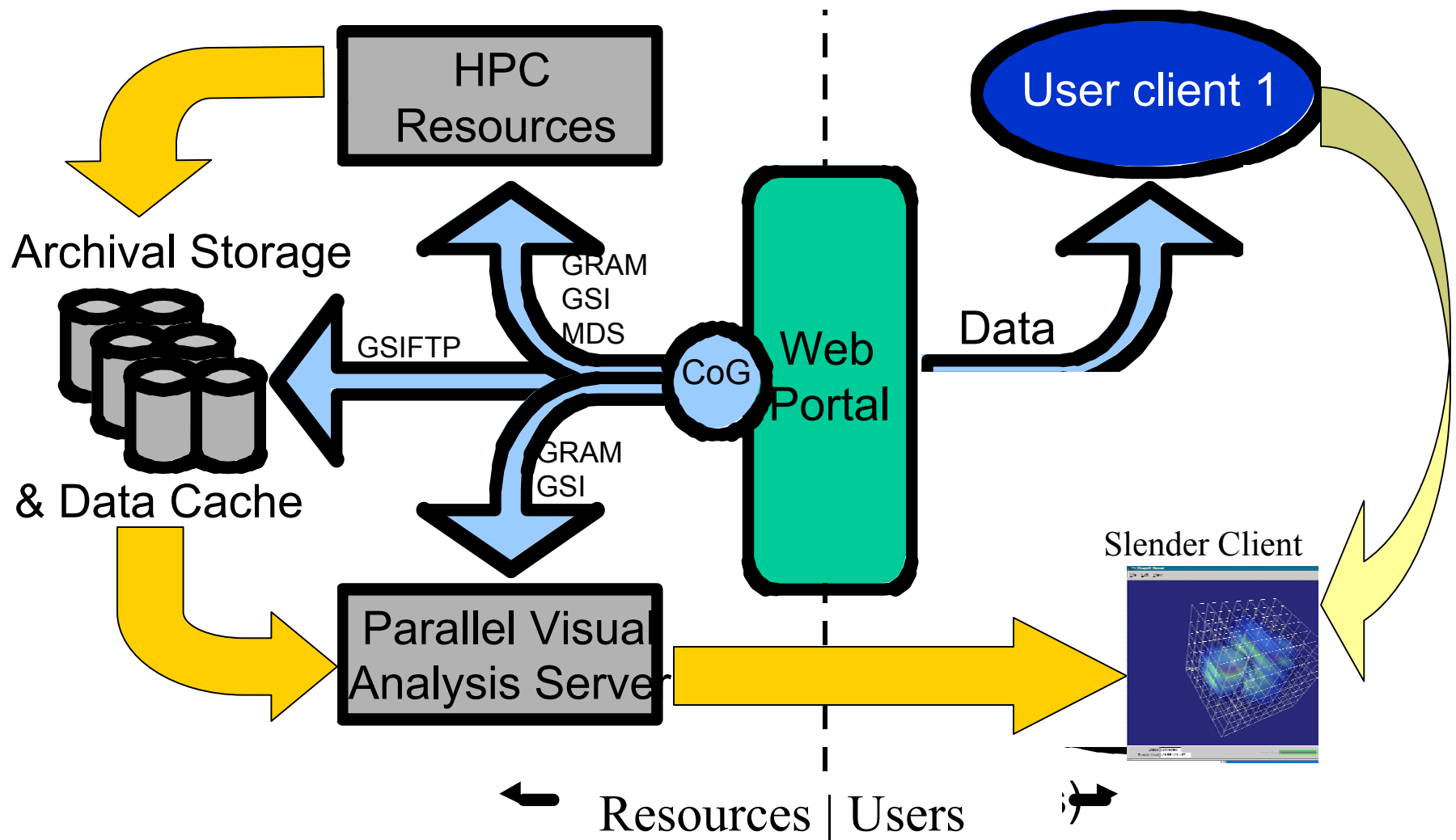


# *Client Deployment Paradigms*

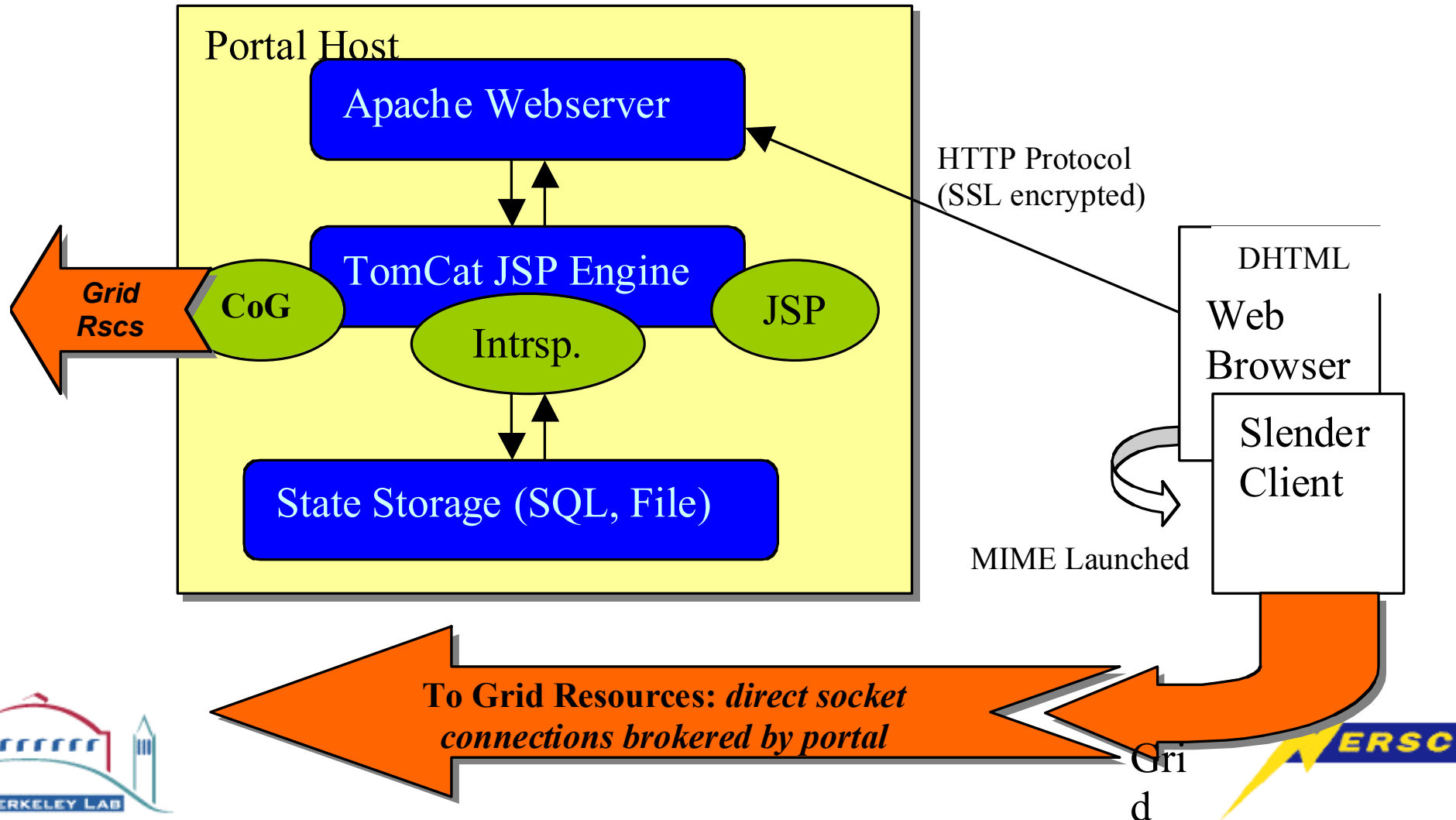
- Thin Client: no client-side software installation
  - *DHTML*
  - *Java Applets*
- Slender Client: minimal client-side installation
  - *Download on each use (signed java apps or small binaries)*
  - *Minimize porting effort with locally-responsive GUI*
- Thick Client: integrating desktop/standalone apps with portal
  - *Portal acts as resource broker*
  - *Portal as central index into distributed data repositories*
  - *Portal as nexus for establishing collaborative sessions*



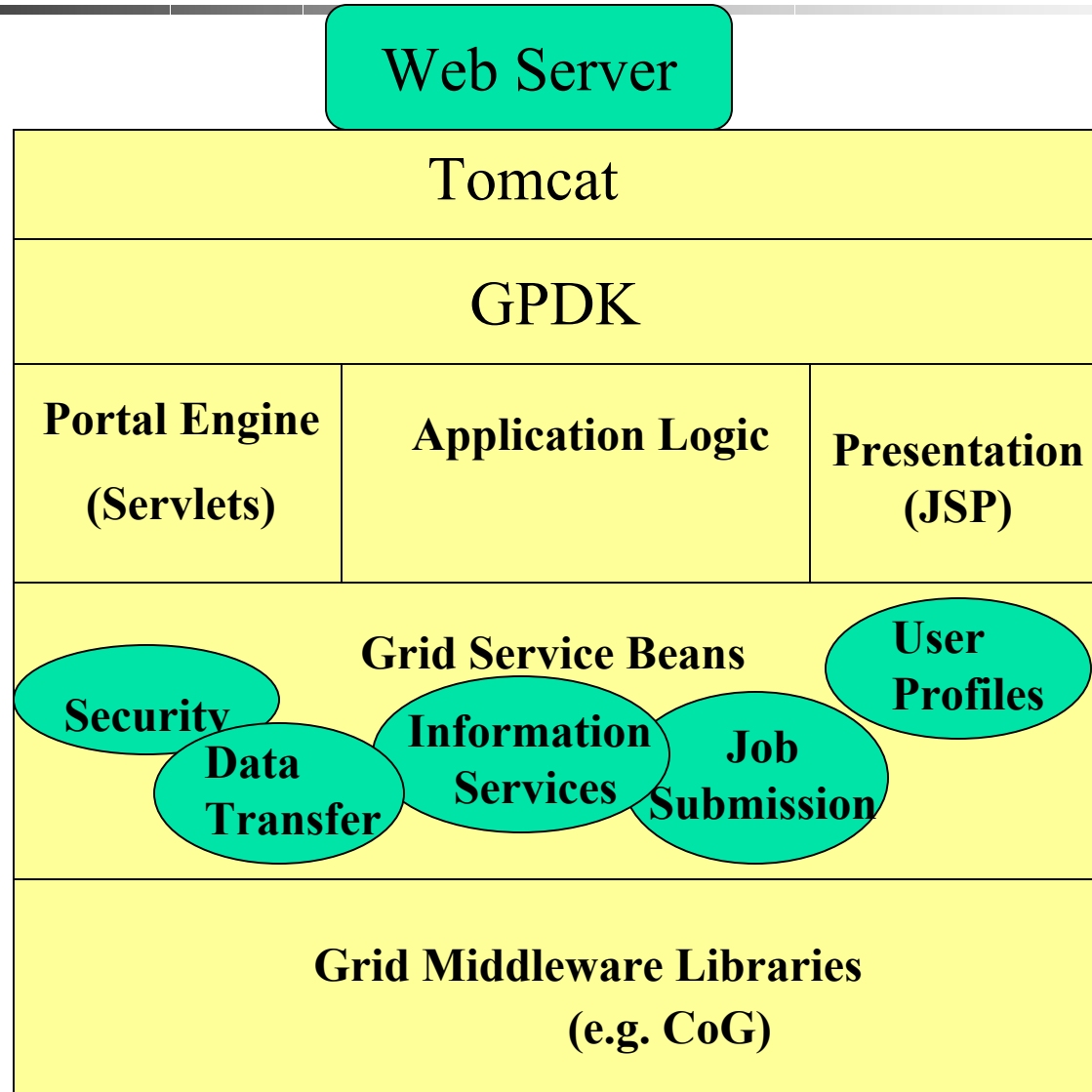
# Portal Architecture (*slender clients*)



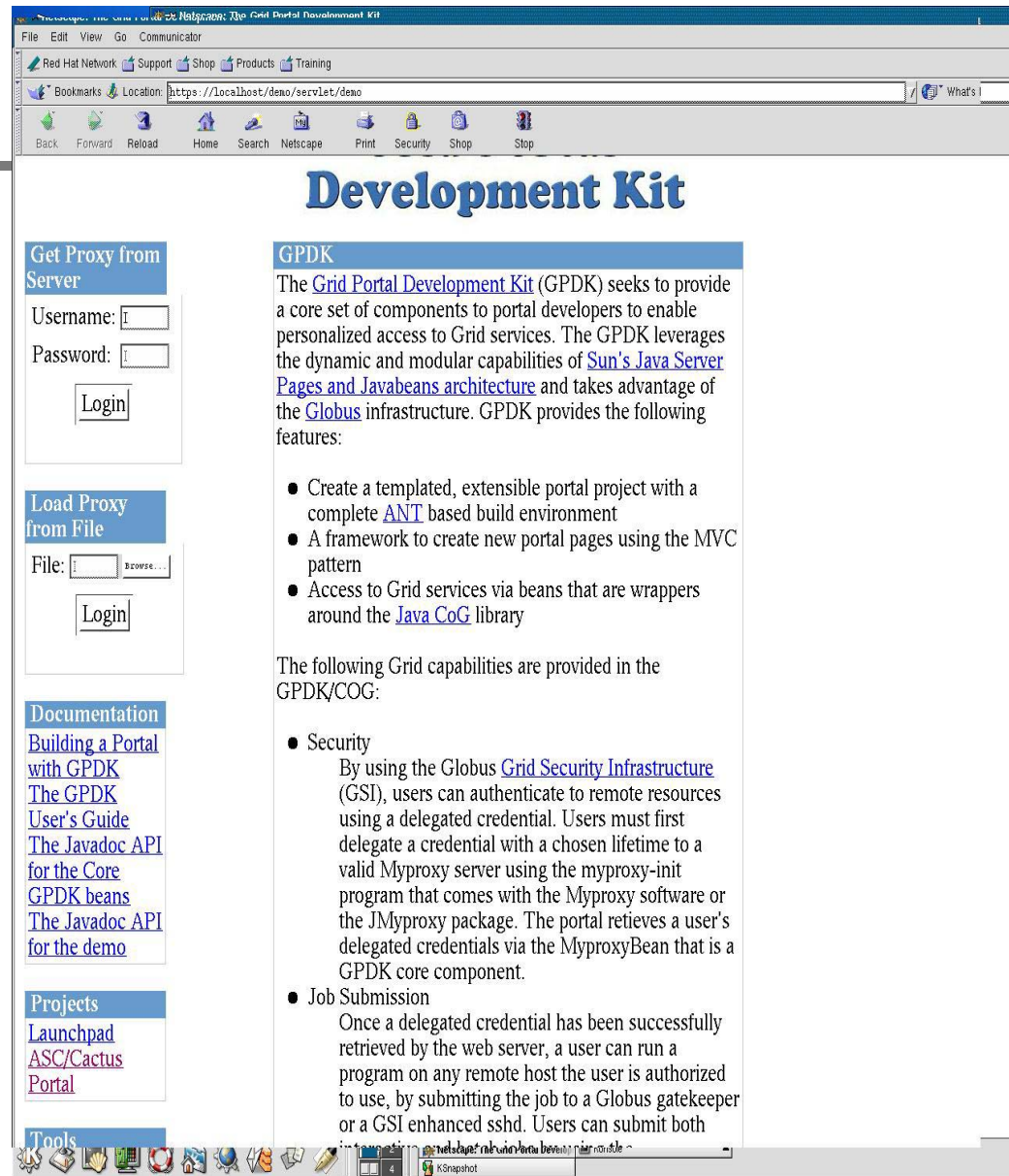
# Internal Architecture



# Internal Architecture



# GSDK Demo Portal



The screenshot shows a Netscape browser window displaying the GSDK Demo Portal. The browser's address bar shows the URL <https://localhost/demo/servelet/demo>. The page has a blue header with the title "Development Kit". On the left side, there are three main sections: "Get Proxy from Server", "Load Proxy from File", and "Documentation". The "Get Proxy from Server" section contains a "Username:" input field, a "Password:" input field, and a "Login" button. The "Load Proxy from File" section contains a "File:" input field with a "Browse..." button and a "Login" button. The "Documentation" section contains a list of links: "Building a Portal with GSDK", "The GSDK User's Guide", "The Javadoc API for the Core GSDK beans", "The Javadoc API for the demo", "Projects", "Launchpad", "ASC/Cactus Portal", and "Tools". The main content area on the right is titled "GSDK" and contains a paragraph describing the GSDK's purpose and features. It lists three features: creating a templated portal project, a framework for creating portal pages, and access to Grid services via beans. Below this, it lists Grid capabilities provided in the GSDK/COG: Security and Job Submission. The Security section describes how users can authenticate to remote resources using a delegated credential. The Job Submission section describes how users can run a program on a remote host. The browser's status bar at the bottom shows the "KSnapshot" application.

## Development Kit

### Get Proxy from Server

Username:

Password:

Login

### Load Proxy from File

File:

Login

### Documentation

- [Building a Portal with GSDK](#)
- [The GSDK User's Guide](#)
- [The Javadoc API for the Core GSDK beans](#)
- [The Javadoc API for the demo](#)

### Projects

- [Launchpad](#)
- [ASC/Cactus Portal](#)

### Tools

### GSDK

The [Grid Portal Development Kit](#) (GSDK) seeks to provide a core set of components to portal developers to enable personalized access to Grid services. The GSDK leverages the dynamic and modular capabilities of [Sun's Java Server Pages and Javabeans architecture](#) and takes advantage of the [Globus](#) infrastructure. GSDK provides the following features:

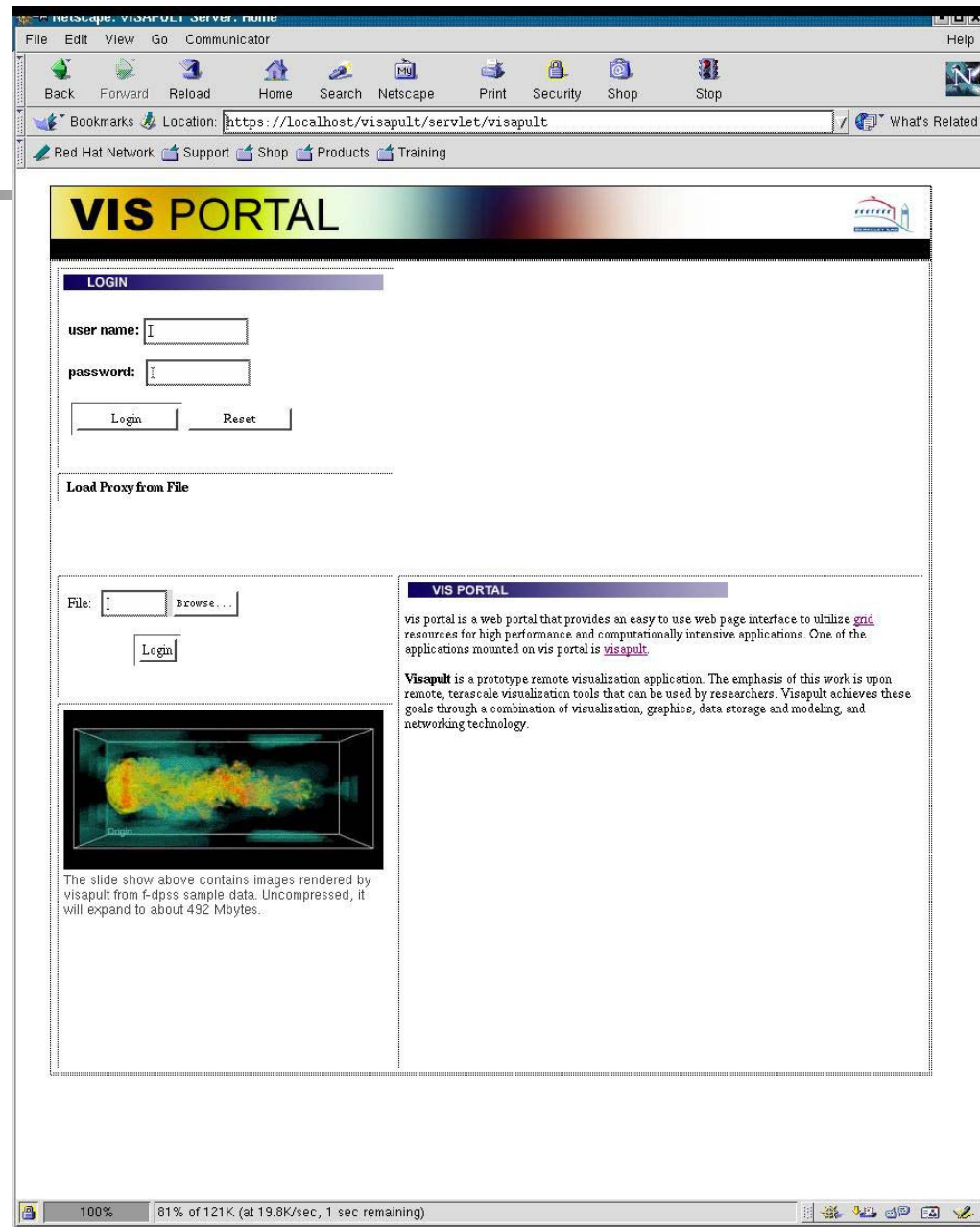
- Create a templated, extensible portal project with a complete [ANT](#) based build environment
- A framework to create new portal pages using the MVC pattern
- Access to Grid services via beans that are wrappers around the [Java CoG](#) library

The following Grid capabilities are provided in the GSDK/COG:

- Security  
By using the Globus [Grid Security Infrastructure](#) (GSI), users can authenticate to remote resources using a delegated credential. Users must first delegate a credential with a chosen lifetime to a valid Myproxy server using the myproxy-init program that comes with the Myproxy software or the JMyproxy package. The portal retrieves a user's delegated credentials via the MyproxyBean that is a GSDK core component.
- Job Submission  
Once a delegated credential has been successfully retrieved by the web server, a user can run a program on any remote host the user is authorized to use, by submitting the job to a Globus gatekeeper or a GSI enhanced sshd. Users can submit both

# Login Page

- Myproxy: Username and password of delegated credential
- Local: Load credential from file



# Profile

- Update user's resources  
job history  
email address

The screenshot shows a Netscape browser window with the address bar set to `https://localhost/visapult/servlet/visapult`. The page title is "VIS PORTAL". The main content area is divided into two sections: "STATUS" and "USER PROFILE".

**STATUS**

Cristina Elena Siegerist  
498385

Time left before session expires: 00:25:26

[Jobs Submitted:](#)  
30

[update profile](#)

[start visapult](#)

[file transfer](#)

[logout](#)

**USER PROFILE**

**Profile for Cristina Elena Siegerist 498385**

[Edit Profile](#) [Authenticate to Resources](#) [Update Environment](#)

**Certificate values:**

- **Subject DN:** CN=proxy,CN=proxy,CN=Cristina Elena Siegerist 498385,OU=People,O=doesciencegrid.org
- **Issuer DN:** CN=proxy,CN=proxy,CN=Cristina Elena Siegerist 498385,OU=People,O=doesciencegrid.org
- **Validity:** Thu Jan 23 16:02:49 PST 2003 - Thu Jan 23 17:07:49 PST 2003
- **Signature Algorithm:** md5WithRSAEncryption

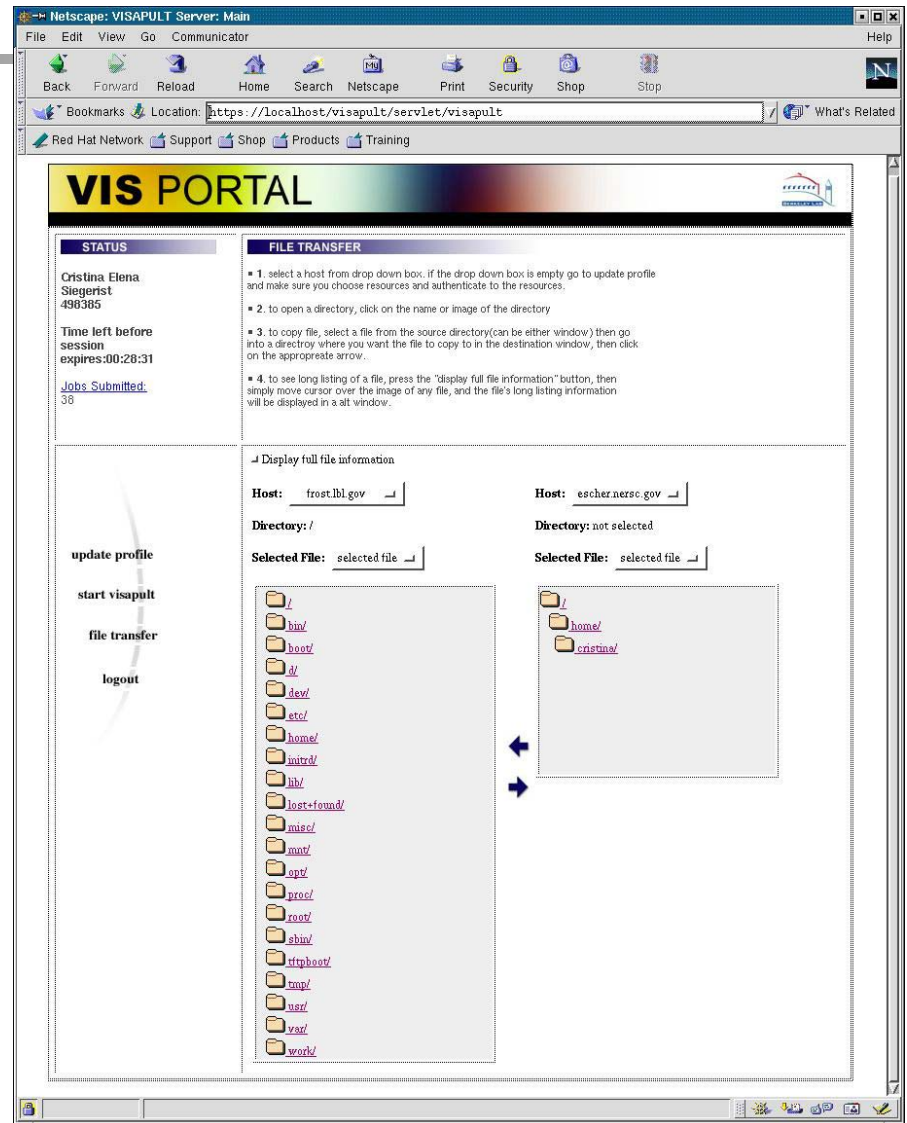
**E-mail address:** cesiegerist@lbl.gov

**Send mail when jobs have completed:**

Hostname	Authenticated?	Home Directory
frost.lbl.gov	true	/
spillane.lbl.gov	true	/
escher.nersc.gov	true	/home/cristina

# File Mgmt.

- Foreground transfers
- Background Transfers
- Globus File Yanker (Shreyas Cholia)





ch Netscape Print Security Shop Stop

t/visapult/servlet/visapult

ucts Training

VIS PORTAL

STATUS

Cristina Elena  
Siegerist  
496385

Time left before  
session  
expires:00:29:00

Jobs Submitted:  
39

START VISAPULT

1.for instructions on how to start visapult, click [here](#).

2.for instructions on how to operate file browsing window, click [here](#).

update profile

start visapult

file transfer

logout

Viewer

Viewer Host

Back End

Data Type

avs

Num Procs

4

res

16

min

10

max

11

palette

Display full file information

Host: escher.nersc.gov

Directory: /home/cristina/visapult/visapult-2/data/

Selected File: selected file

/

home/

cristina/

AMRDData/

AMPRRenderer/

AVSProj/

etc/

globus/

grid.txt

idl.ps

javascript.txt

makempg.pro

mpg\_batch\_idl

nsmail/

sc99Palette

selected file

rest1.eps

rest2.eps

visapult/

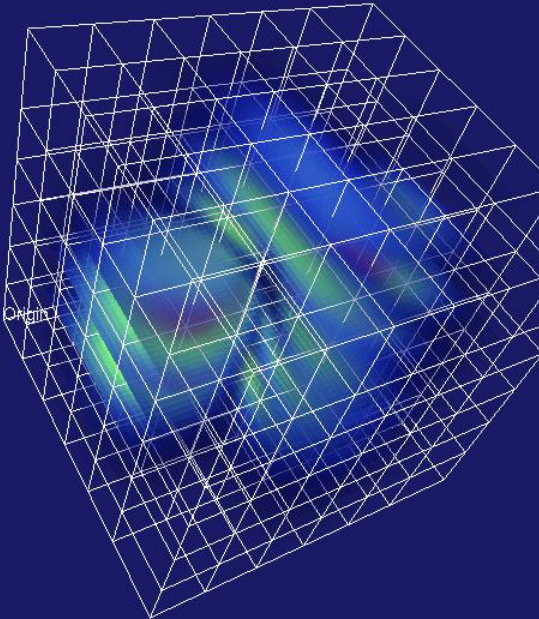
visapult-2/

CVS/

backEnd/

Visapult Viewer

File Edit View



Statusconnected

Remote Host128.55.128.157

Time Step

01/23/03

4:19



**VISPORTAL Server: Start AMR Renderer - Netscape**

File Edit View Go Bookmarks Tools Window Help

https://frost.lbl.gov/visportal/servlet/visportal

Home My Netscape Search Shop Bookmarks Red Hat Netw... Training Support Software Hardware Developers Embedded Search Documentati

VISPORTAL Server: Start AMR Ren...

# VIS PORTAL

**STATUS**

Cristina Elena  
Siegerist 498385

Time left before  
session  
expires:00:29:52

Jobs Submitted: 5

**AMR Data Selection**

Visualized variable: density

Visualized time step index: 0

Palette mapping range from 1.350000 to 2.700000 **Activate**

**Interactivity Settings**

Static hierarchy depth: 2

Dynamic Rendering Mode

- Wireframe
- Volume Rendering

Dynamic hierarchy depth: 0

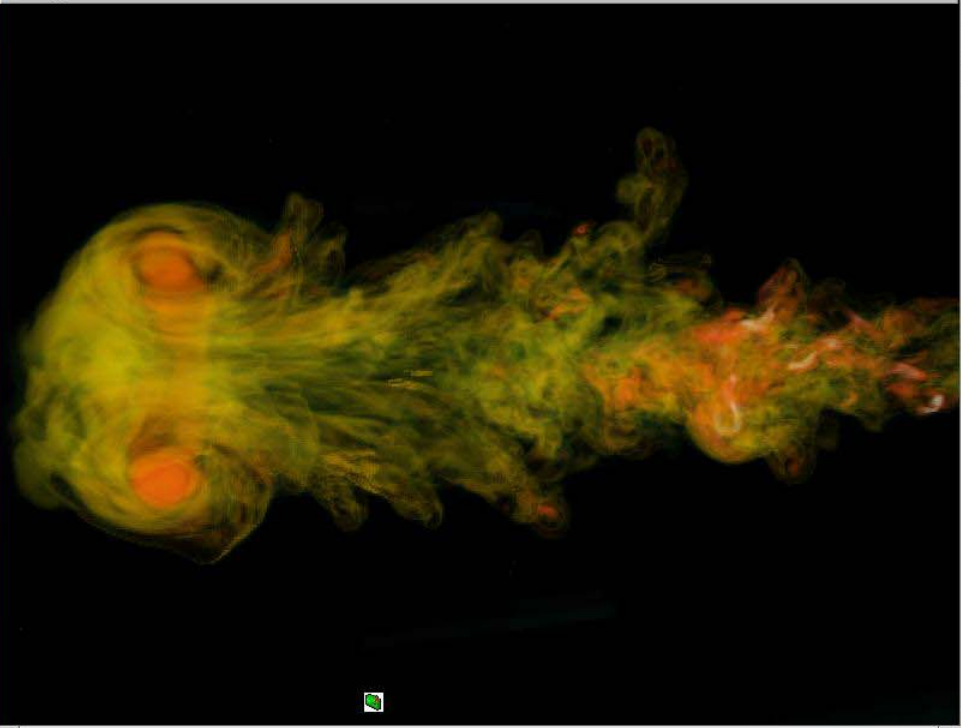
Pixel reduction factor: 1

Transmit compressed images

Compression quality: 0.00

**Remote AMR Volume Visualization**

File View



Num Procs: 4

☐ Display the file size information

☐ Display the date of file creation

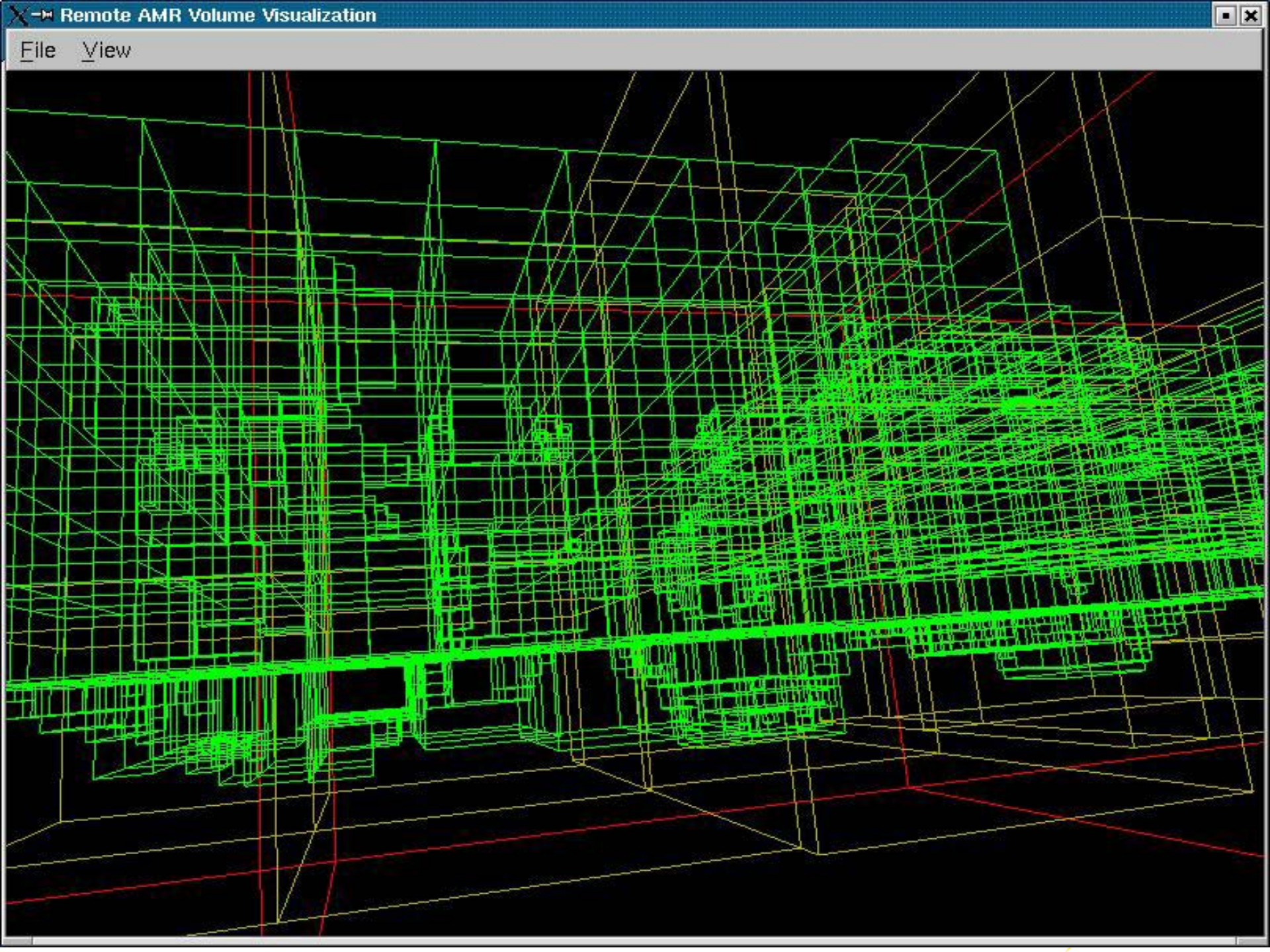
Host: escher.nersc.gov

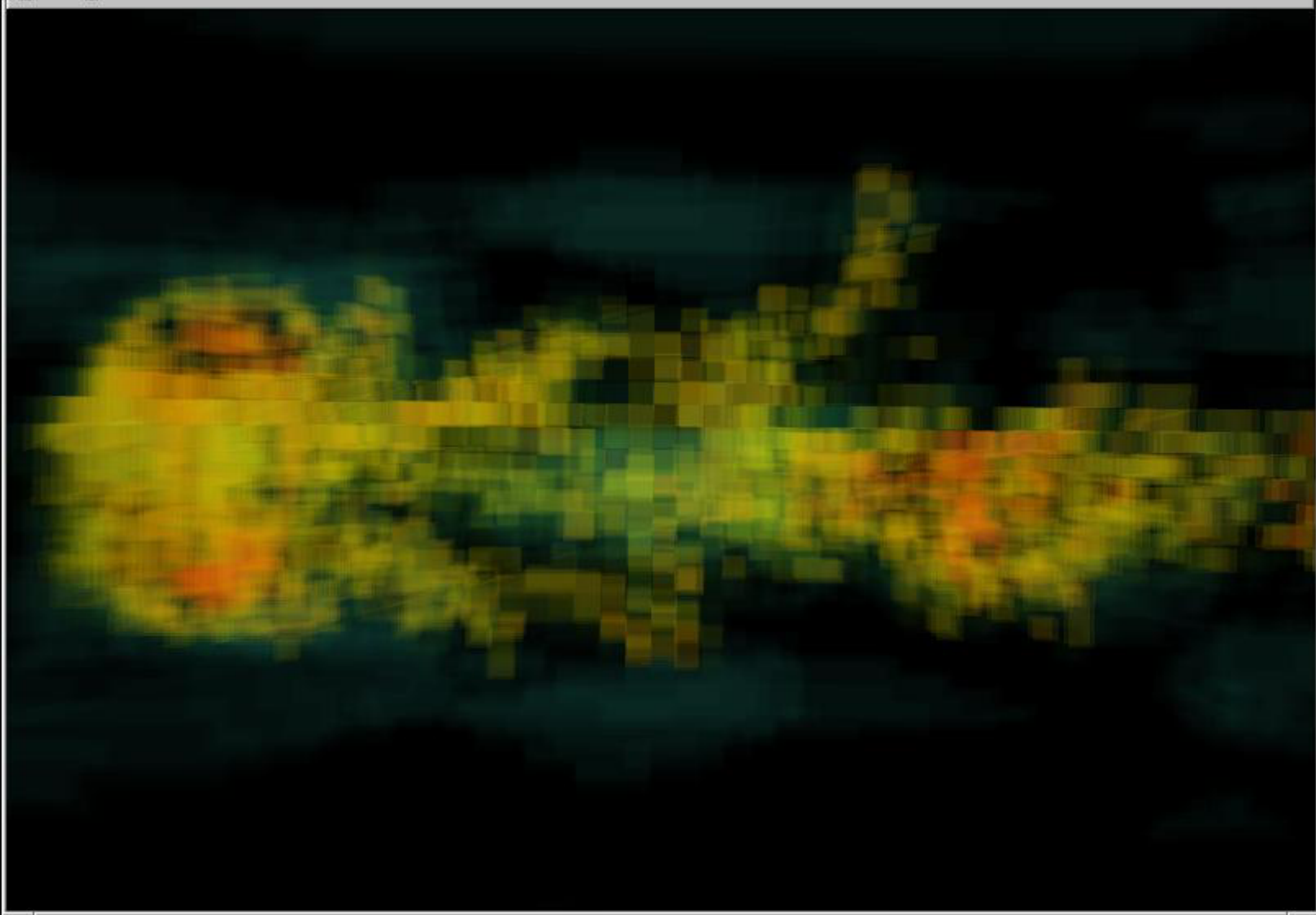
Directory: /home/cristina/

Selected File: select file

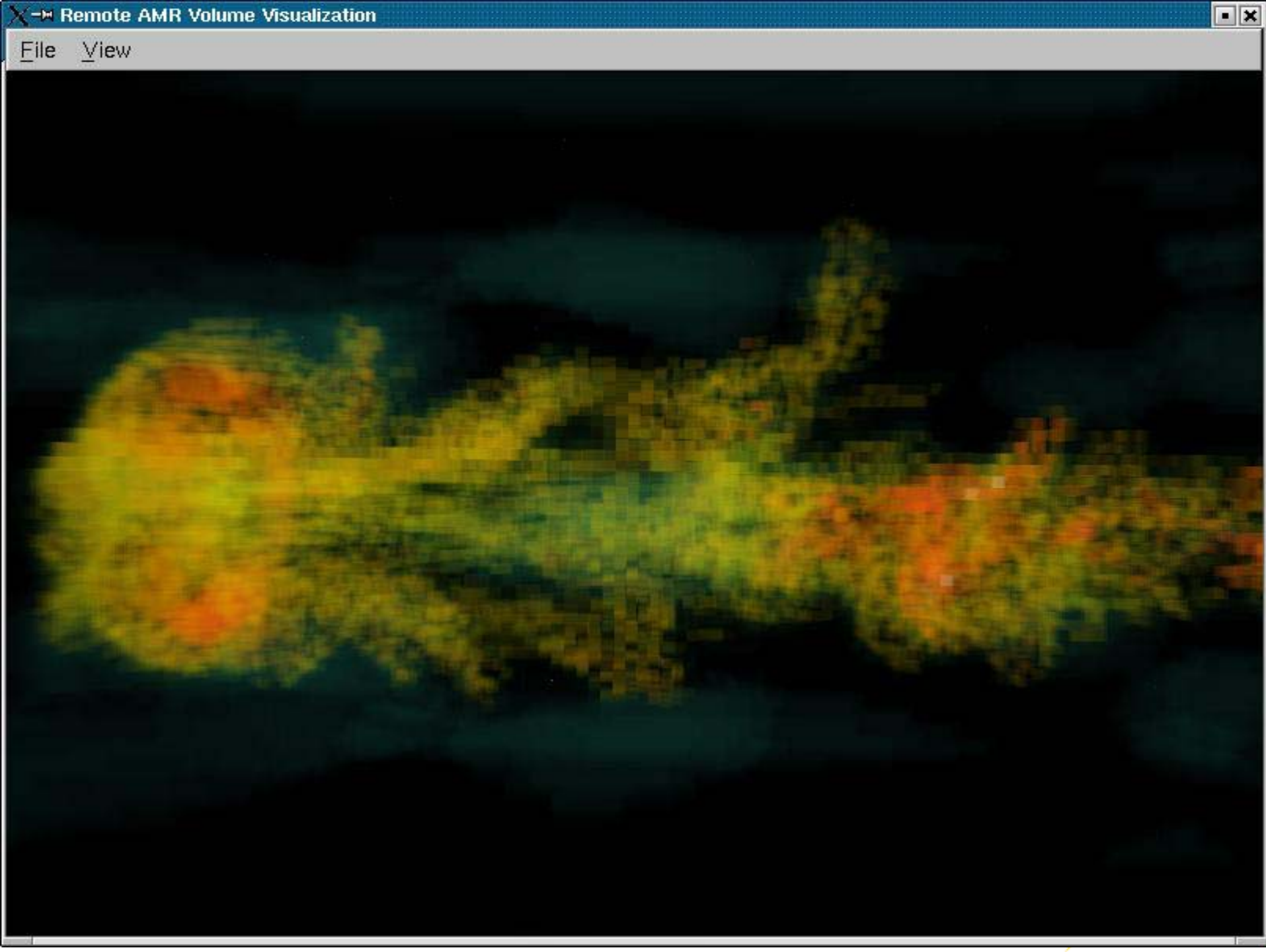
- /
- home/
- cristina/
- AMRData/
- AMRRenderer/
- AVSProj/
- IDL/
- IDLTEMP/
- MFurman/
- Ricardo/
- etc/
- file1.test
- globus/
- gram\_job\_mgr\_141242.log
- gram\_job\_mgr\_141247.log

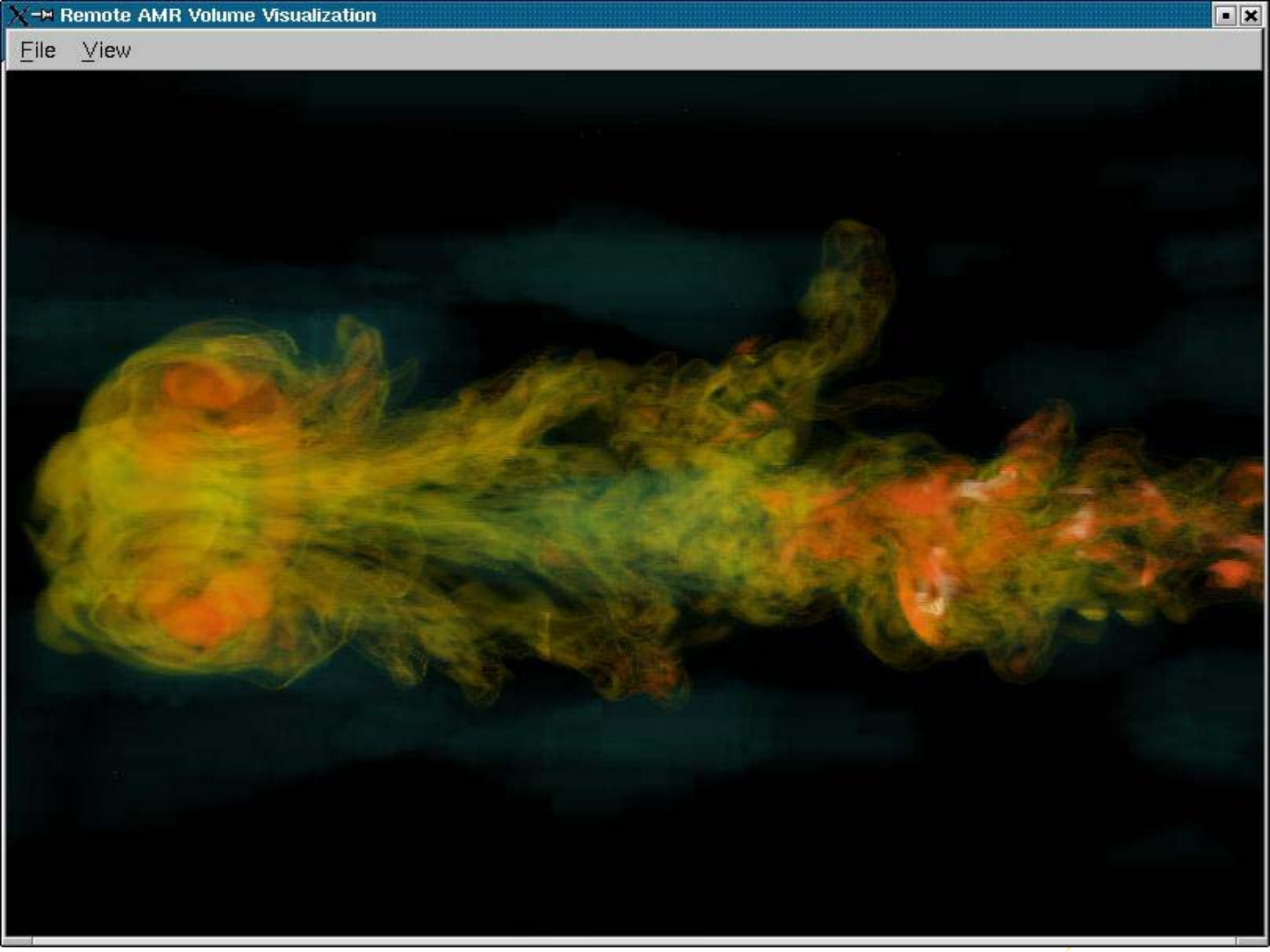












QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.





# Placeholder for MPEG Gen





# Future

---

- Implementing specific user workflows
  - Global Climate Models (*Wehner*)
  - Particle Accelerator Simulations (*Aadelman*)
- Integration with other portal efforts
  - ASC, GridLab
- OGSA / GT3.0
- Gridlab/GridSphere (*Novotny/Russell*)
  - SQL for state storage (*ASC Portal*)
  - Portlets/Sportlets
- Integration with SRM (*Shoshani*)
  - HRM and central file indices
  - Metadata catalogs and search front-ends



# Conclusions

---

- Good for
  - Workflow automation
  - Central data indices
  - Reducing visible complexity of Grid/Grid Apps
  - Less of a burden on cross-platform regression tests
- Bad for
  - Interactivity (that's why we have slender clients)
  - More burden for development time
  - File perms/access remains a serious unresolved problem
- Users will change the direction of this entire project



# References

---

- The Grid Portal Development Kit, J. Novotny, Cuncurrency: Pract. Exper. 2000; 00:1-7
- Building a Portal Using GPDK: A Developers Tutorial, J. Novotny, <http://doesciencegrid.org//public/events/GPDW/slides/gpdk-dev.pdf>
- An Online Credential Repository for the Grid: MyProxy, J. Novotny, S. Tuecke, Von Welch, Proc. 10<sup>th</sup> IEEE Symp. On High Performance Distributed Computing, 2001
- Deploying Web-based Visual Exploratin Tools on the Grid. T.J. Jankun-Kelly, O. Kreylos, J. Shalf, K-L. Ma, B. Hammann, K. Joy, E.W. Bethel. IEEE Computer Graphics and Applications, march/april 2003.
- GPDK Site: [www.doesciencegrid.org](http://www.doesciencegrid.org)
- Java CoG <http://www-unix.globus.org/cog/java/>
- Visapult Site <http://vis.lbl.gov/projects/visapult2/index.html>
- CIPIC: <http://cipic.ucdavis.edu>